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FLOODS IN THE ARGENTINE REPUBLIC.

Heavy rains, accompanied by much flooding, occurred very generally throughout almost the whole of the Argentine Republic between the 21st and 27th of April, in which period from 8 to 14 inches of rain fell, according to locality, in the northern section of the country. These amounts are quite unprecedented for the season of the year over a long term of years. The heaviest downfalls occurred in the provinces of Santa Fe and Entre Rios. We have not yet seen the Argentine Daily Weather Maps for the above period, but from *La Nacion* for April 25th, which devotes over eight columns to the storm then in progress, we note that in the twenty-four hours ending 8 a.m. on the 24th, considerably more than 5 inches of rain fell over a wide area. The maximum daily falls reported were 9·10 in. at Mansilla and 8·66 in. at Atreucó in Entre Rios, and 8·54 in. at Helvecia in Santa Fe. The cyclone seems to have reached its greatest intensity over the maize belts in the province of Entre Rios where seventeen of the thirty-nine reporting stations measured more than 6 inches of rain in the 24 hours referred to. In the vicinity of the Capital, the maximum fall seems to have been about 5·50 in. Previous inundations in the vicinity of the city of Buenos Aires having shown the desirability of canals to run off the surplus water in the inundable zone during times of flood, it is to be noted with concern that there is a general outcry that the canals have done more harm than good. It is undoubtedly a fact that, however much these canals serve as auxiliary collectors to run off the surface water in times of excessive rainfall for the total area taken as one unit, their construction, with their natural banks, has intercepted the natural depressions through whose courses the surface waters hitherto found an exit.

Previous floods in the province of Buenos Aires occurred in 1845, 1857, 1877, September 1884, January 1889, March 1895, August 1899, March 1900, and April and May 1911, those of 1884, 1900 and 1911 being locally of much the same intensity as the recent visitation. We do not think, however, that the Argentine records show anything approaching such a wide-spread rainstorm as that of April, 1914. Owing to the impassable state of the roads it has been found impossible to bring the maize crop to the railway stations in

many instances, with the result that an enormous deficit as compared with last year is already apparent in the receipts of the various railway companies. Heavy rains are also reported as having taken place during the first half of May, which still further increases the difficulties of road transit.

PROPOSED SCOTTISH OCEANOGRAPHICAL INSTITUTE.

A National Oceanographical Institute in Scotland is proposed as a memorial to the late Sir John Murray. At a largely attended meeting held in the rooms of the Royal Society of Edinburgh, on May 25th, Lord Strathclyde in the chair, Professor Geikie moved, "That a permanent foundation of an Oceanographical Institute in the capital of Scotland is highly desirable." Professor Geikie said it seemed obvious that the prestige of Britain in oceanographical science should be maintained, and there were very special reasons why Scotland in particular should be interested in this matter, for at the present time the only laboratories in these islands that dealt with world-wide oceanographical problems were the two laboratories established by their late lamented friend, Sir John Murray, and Dr. W. S. Bruce.

It was pointed out that Sir John Murray's laboratory was established in 1876, on his return from the *Challenger* Expedition, while Dr. Bruce's was begun 21 years later. In the *Challenger* office was housed the finest collection of deep sea deposits in the world; while Dr. Bruce's laboratory was specially rich in polar marine fauna, notably in abyssmal forms.

Professor Sir Edward Schäfer, who seconded, said there could be no doubt Sir John Murray, were he with them that day, would have been the first to join in welcoming the establishment of such an institute upon a firm and permanent basis, and indeed, it was a well-known fact that it was his intention to take steps with the view of making some permanent foundation such as was now proposed, and for which they had already such a splendid nucleus available.

Dr. John Horne said that one of the main objects of the scheme was to have within the city of Edinburgh a permanent memorial to the services rendered by the late Sir John Murray to the science of oceanography. Sir John Murray was the recognised leader of that branch of science in his life-time, and he left behind him a collection of deep-sea deposits that were without rival in the world. He believed that a further purpose was to establish a lectureship in oceanography within the University, and to affiliate the combined collections of Sir John Murray and Dr. Bruce with the University.

Lord Strathclyde moved :—"That a Committee be formed for the purpose of considering how such an institution may best be organised, with power to issue an appeal for funds."

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday afternoon, May 20th, at 70, Victoria Street, Westminster, Mr. C. J. P. Cave, M.A., President, in the chair.

Mr. E. Gold read a paper on "The Reduction of Barometer Readings in Absolute Units, and a New Form of Barometer Card."*

Mr. A. Hampton Brown also read a paper on "A Cuban Rain Record and its Application," in which he dealt with the rainfall records of the Belen College Observatory, Havana, for the period 1859 to 1912, and gave particulars of the monthly, yearly, and seasonal rainfall. The mean annual rainfall is 49·96 in.; that of 1867, the wettest year, 71·40 in., and of 1899, the driest year, 27·90 in. The driest month on the average is March with a rainfall of 1·91 in. closely followed by February and April with rainfalls of 2·16 and 2·23 in. respectively. The wettest months are October 6·92 in., and June 6·71 in. The dry season is from November to April with a downfall of 14·6 in. or 29 per cent. of the annual total. The wet season is from May to October with 35·4 in.

The monthly totals exhibit large variations at all times of the year. The most phenomenal month was April 1869, when 22·57 in. fell on 6 days. In only one other April has the total exceeded 8 in., and in 1896 no measurable rain was recorded in that month. October, the wettest month of the year, shows the least variation from its normal fall.

Droughts are frequent and often of severe character when considered with the high temperature, bright sunshine, and low humidity. On three occasions in the fifty years rainless months occurred.

In the second portion of this paper the Author has made an endeavour to apply or connect the information contained in the data, in order to trace, if possible, its bearing on the meteorological conditions of some other part of the world.

He found from a comparison of the Havana rain data since 1878 for the wet season (May to October) with the precipitation in England South-West, and South Wales during the three months January to March following, that an excess rainfall in Havana during May to October was generally succeeded by a deficient rainfall in England, S.W., at the beginning of the next year, and *vice versâ*.

For the eight years 1888 to 1895, when the percentage at Havana was continuously in excess, in England S.W. the figures with one exception were the reverse. Again, during the next five years, 1896-1900, there was a deficiency at the Cuban station, and, excepting 1897, excess in England. There are several years where the application fails, but the general continuance of the see-saw movement is so remarkable that it can hardly be regarded as a coincidence, since the correlation co-efficient gives r equal to—·54 with a probable error of ·08.

* See special article on p. 85.

Possibly the secret of the connection between the two spheres of observation lies hidden within the interaction of currents, but the data for the detailed examination of the winds, currents, and temperature of the Atlantic are not easily obtainable, and must be left to those who have more access to the material required.

Mr. F. J. W. Whipple read some notes by Capt. Campbell Hepworth who had found that it took 25 days for water to travel from the Gulf of Mexico to our shores. Capt. Hepworth showed that the Gulf Stream, the Atlantic sea-surface temperatures and the surface currents had a marked influence on the climate of the British Isles.

Col. H. E. Rawson referred to researches of Dr. W. N. Shaw, Mr. W. H. Dines and others, in establishing a connection between the weather records at St. Helena and the weather in the south of England.

Mr. A. P. Jenkin and the President also spoke.

Dr. Hans Pettersson exhibited and gave an account of an ingenious current-meter invented by his father Professor Otto Pettersson of Stockholm, the eminent Swedish oceanographer.

The following gentlemen were elected Fellows of the Society:—Mr. A. H. R. Goldie, M.A., B.A., Capt. J. B. R. Haines, Mr. P. J. O'Gara, B.Sc., Mr. T. L. Patterson, M.A., Mr. H. D. Roger, L.L.B., Mr. J. G. Rodger, Ph.D., B.A., B.D., Mr. D. M. Turner, M.R.S.I.

METEOROLOGICAL NEWS AND NOTES.

Dr. H. R. Mill has returned to England from a voyage round the World, including a stay of some months in New Zealand. We are glad to learn that his health has considerably improved during the long rest.

Dr. W. S. Bruce has been awarded the Neill Prize by the Royal Society of Edinburgh in recognition of the scientific results of his Arctic and Antarctic explorations.

Commander W. F. Caborne, C.B., F.R.Met.Soc., has been appointed one of the two nautical assessors in connection with the inquiry to be held by the British Commission into the loss of the C.P.R. liner *Empress of Ireland*, and left with the other members of the party by the Cunard steamer *Mauretania* on the 6th inst.

Sir John W. Moore, M.D., delivered a lecture before the Royal Societies' Club, on May 27th, the subject being "Weather Study in 1914," illustrated by numerous lantern slides. Mr. E. B. Knobel, Past President of the Royal Astronomical Society occupied the chair, and there was a good attendance. A discussion followed in which Dr. W. N. Shaw, among others, took part.

Mr. H. Norman Edge has been recently appointed Honorary Lecturer on Meteorology to the Lancashire (Navy League) and National Sea Training Homes, Liscard, Cheshire.

THE CORRECTION AND REDUCTION OF BAROMETER READINGS.*

By E. GOLD, M.A.

THE decision of the Meteorological Committee to use absolute units for the values of pressure published in the Daily Weather Report made it necessary to consider the question of the reduction of barometer readings in these units.

When a mercury barometer is used for measuring atmospheric pressure, the readings taken at different times are only comparable if a correction is made to allow for the difference between the temperature of the instrument at the time of observation and some standard temperature. The values at different places are comparable only if further corrections are made on account of the variation of gravity and of the effect of the altitude upon the pressure.

The three corrections may be applied separately, but in many cases the correction for gravity is incorporated with the correction for altitude in one table. This is easily done, because both corrections are proportional to the height of the barometer, and the gravity correction does not vary in any other way at a fixed station. The correction for the temperature of the instrument is also proportional to the pressure, but it is not possible to incorporate this in the same table as it varies with the temperature, while the altitude correction varies with the temperature of the outside air. The different corrections can, however, all be incorporated in one table of double entry. Such a table was given by Mr. Marriott in the *Quar.Jour. Roy.Met.Soc.* for 1875. That table was made on the principle that the effect of an increase of pressure upon the final correction could be just counter-balanced by an appropriate increase in the temperature of the air. A similar table could be prepared on the principle that an increase in the temperature of the air can be just counter-balanced by an increase in the value taken for the temperature of the instrument, and this principle has been utilized in preparing the new cards for use at stations of the Meteorological Office.

Instead, however, of using a table of double entry, a small auxiliary table is used to indicate what alteration must be made in the actual reading of the "attached thermometer" to obtain the value to be used as argument in the main table. For moderate altitudes, such as occur at most places in the British Isles, the alteration is not large, and the process of correcting the readings of the thermometer is much simplified.

For use with barometers at sea and at low-level stations, a barometer might be used whose attached thermometer is graduated to give directly in units of pressure the correction necessary to allow for the temperature of the instrument. Further, by making the

* Abstract of a paper read before the Royal Meteorological Society on May 20th, 1914.

scale movable, the additional corrections for altitude and gravity can be allowed for, so that one reading gives the final correction to reduce the reading to standard temperature, gravity and mean sea level.

It is an early tribute to the new units that they should lead in this way to economies in the labour of dealing with pressure data.

INTERNATIONAL BALLOON ASCENTS.

By W. H. DINES, F.R.S.

June 7th, 1911.

Starting Point.	Country.	A (H_c.) miles.	B (T_c.) ° F.	C miles.	D ° F.	E miles	F
Manchester	England ..	—	—	7·3	—78	16	S.
Pyrton Hill	,, ..	7·2	—80	9·5	—76	7	W.S.W.
Brussels	Belgium ..	7·6	—89	10·5	—72	17	S.W.
Hamburg	Germany ..	8·0	—84	8·2	—82	51	S.S.E.
Lindenberg	,, ..	7·9	—71	10·4	—72	59	S. by E.
Strassburg.....	,, ..	7·7	—84	8·8	—78	39	W.S.W.
Munich	,, ..	7·8	—87	9·9	—72	37	S.W.
June 8th, 1911.							
Limerick.....	Ireland	8·0	—77	10·7	—63	19	W. by N.
Pyrton Hill	England ..	7·5	—77	10·6	—69	10	W. by N.
Brussels	Belgium ..	8·1	—78	11·6	—72	29	S. by W.
Hamburg	Germany ..	8·3	—78	8·5	—74	72	S.E.
Paris	France ...	7·5	—68	9·9	—69	12	N.W.
Strassburg	Germany ..	7·9	—78	11·4	—65	28	S.E.
Munich	,, ..	8·0	—78	8·7	—72	51	S.E. by E.
Pavlovsk	Russia	5·4	—55	9·8	—45	3	N.W.
Nishni Olchedaeff	,, ..	7·2	—75	8·0	—72	117	S.E. by E.
June 9th, 1911.							
Limerick	Ireland....	7·5	—76	8·2	—76	30	S.
Manchester.....	England ..	7·2	—81	10·5	—72	63	S.E.
Pyrton Hill.....	,, ..	7·5	—71	10·0	—56	41	S.E. by E.
Brussels	Belgium ..	7·8	—76	?	—	33	E.S.E.
Paris	France ..	7·1	—71	9·9	—63	19	E.S.E.
Munich	Germany ..	8·1	—72	9·5	—62	39	S. by E.
Pavlovsk	Russia	5·4	—57	8·0	—45	9	N.N.E.

A Height in miles of commencement of isothermal column.
B Temperature, F°., at bottom of column.
C Greatest height of reliable record in miles.
D Temperature, F°., at greatest height.
E Distance in miles of point where balloon fell.
F Bearing of falling point from starting point.

On the 7th the pressure was high over West and Mid-Europe, but fell steadily without much change of distribution during the following days.

Except at Pavlovsk the value of H_c was unusually high throughout.

THE GULF STREAM.

At a meeting of the Royal Geographical Society, held on Thursday, May 21st, at the new premises of the Society in Kensington Gore, Commander M. W. Campbell Hepworth, C.B., R.N.R., delivered a lecture on "The Gulf Stream;" the chief purport of which was to prove that the warm saline waters, which contribute to the salubrity of the British Islands, are mainly derived from that stream, a branch of which, he concluded, penetrates into the north-eastern North Atlantic, and even farther north.

After a reference to the various theories, to account for currents generally and for the Gulf Stream specially, that have been advanced from time to time, and the facts that have been marshalled to disprove them, the lecturer went on to say that wind is the prime cause of all currents, and persistent winds, like the trade winds, the motive power to which all the great ocean streams may be attributed. He then traced on a current chart of the Atlantic, which was projected on the screen, the flow of the trade winds, drift currents and of the Equatorial Current, the parent of the Gulf Stream, from the sources of the drift currents to the entrance of the latter to Florida Strait and thence to the North Sea, the Norwegian Sea, the Baltic and the Barents and Greenland Seas, mentioning in passing their velocities in various localities in different seasons.

Referring his audience to charts of mean annual surface temperature and salinity of the North Atlantic, which were exhibited, he pointed out that the north-eastern portion of the North Atlantic, the southern portion of the Greenland Sea, and part of the Barents Sea, are supplied with water of the same surface temperature and salinity as that which is found in the Gulf Stream between Cape Hatteras and its place of meeting with the Labrador Current. Combating the statement that the evidence of marine biology disproves the Equatorial origin claimed for the warm stream which reaches our shores, the lecturer showed on the screen a reproduction of a Plankton map of the Atlantic—summer state—by the Swedish chemist and botanist, Clevé. Admitting that the Equatorial Plankton-types are not represented in this map, among others, in the north-eastern Atlantic, he pointed out that neither are types of Arctic origin shown farther south than 45° N., although the waters of the Labrador Current are known to penetrate to tropical regions; and he expressed the belief that no animals belonging to the oceanic Plankton can with certainty be said to be exclusively equatorial, because animals that are found in the hot water region have a wide range and spread over warm water regions. Plankton of tropical origin is, however, not infrequently found near our shores; Physalia (Portuguese Man-of-war), which frequent the tropics, was present in the English Channel in March and April, 1912; and a shoal of Liriopi (Trachomedusae) belonging to tropical regions was found off Plymouth last October. The medusoid fauna of the Gulf Stream off the Tortugas is well

known, but it has a short life, and the time limit is an important factor unless reproduction were to take place while drifting northward.

Whether the warm saline water which reaches our coast is derived from the Gulf Stream or takes its origin elsewhere must, for the present, remain an open question; but this, at least, we know, that from Florida Strait northward to the edge of the Grand Bank, thence north-eastward and eastward across the ocean, aided, doubtless, by prevailing winds, there exists throughout the year a continuous flow of warm saline water, to the north-easterly branch of which these Islands own much of their salubrity.

Captain Hepworth then showed, by means of diagrams, the somewhat frequent correlation of sea temperature with air temperature over the British Islands during the decade 1903–1912.

Alluding to the oft-repeated question, "Has the Gulf Stream changed its course?" he remarked that in so comprehensive a form this question cannot always be met by a negative; but, he added, that there appears to be no justification for the assumption that important changes in the circulation of the North Atlantic have taken place in historic times; but that the velocity and volume of the stream exhibit modifications that are non-periodic as well as those that are periodic, and that when the stream is abnormally active its resistance to the Labrador Current is probably carried farther north than usual, with the result that warm saline water penetrates farther north than its average seasonal limit, and *vice versa*.

The lecturer concluded by a reference to an investigation undertaken at the Meteorological Office, in the course of which there was found to be some evidence to prove that departures from the average strength of the Trade Winds, during a series of months and at times even of one month, were roughly reflected in deviations from the normal in the distribution of the surface temperature of the North Atlantic, through the agency of the Equatorial Current and Gulf Stream in corresponding months of the succeeding year; notwithstanding the many causes tending to mask the inter-relation.

Proof may therefore be claimed, he summed up, resting on a chain of evidence, that many of the climatic changes, to which our Islands are subject, owe their origin to modifications in the Trade Winds of the Atlantic, communicated through the agency of the great Equatorial Current and of its giant offspring, the Gulf Stream.

In the discussion that followed Dr. W. N. Shaw said that the extension of the Gulf Stream to waters round our coasts would, in his opinion, be marked by a steep temperature gradient in a similar manner as that which obtains at the meeting of the stream with the Labrador Current. The survival of the stream after its collision with the Arctic Current appeared to him doubtful. With regard to the influence of the sea temperature upon air temperature over the British Isles, he thought that the diagrams exhibited did not often bear out the correlation claimed in this connection, and he would not expect sea temperatures to have much influence upon our climate

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because our islands lay immediately to the west of the great European Continent, which necessarily was a dominant factor.

On the motion of the Chairman a cordial vote of thanks was proposed to Commander Hepworth for his lecture.

THE WEATHER OF MAY.

TAKING the British Islands as a whole, the mean temperature of the month was in close agreement with the normal, being only 0°·2 in excess of the average. Temperature was very slightly below the normal in the west and north of Scotland and north of Ireland. In most other districts the excess was small, ranging from 0°·2 in the south of Ireland and 0°·4 in the Channel Islands to 1°·0 or more in the east of Scotland and England and the midland counties, the warmest districts being England N.E. and E., with values of 1°·8 and 1°·5 respectively in excess of the average.

The month opened with an area of high pressure lying directly over our Islands, and during the first three days very sharp frost was recorded in most districts, the lowest temperatures as a general rule being noted on the 2nd, when the shade thermometer fell to 24° at Balmoral, at Worksop (Hodsock Priory), and to 25° at Buxton. At Worksop the temperature was lower than in any May for 35 years.

On the 3rd a deep cyclonic centre appeared in the west, and for several days thereafter a large barometrical depression lay over our Islands, which was associated on the 5th with thunderstorms in the north and east. On the 7th and 8th small shallow cyclonic disturbances caused heavy rain in some northern districts, 1·90 in. falling at Cawdor and 1·27 in. at Drumnadrochit on the 7th, and 3·38 in. at Drumnadrochit, 2·50 in. at Keith, and 2·03 in. at Loch Stack on the 8th. On the 9th slight snow showers occurred in the north, and from this date till the 13th sharp frost was again noted in many localities, the lowest being 26° at West Linton on the 10th. After the 13th a spell of very fine warm anticyclonic weather set in, which continued till the 22nd, on which day the shade temperature rose to 82° at Tottenham, and 80° at Norwich and Wisley (Surrey), but in northern districts, which were largely influenced by cyclonic disturbances, comparatively cool and generally unsettled weather predominated, rain falling frequently. On the 23rd, when a low-pressure system had developed over the North Sea, a marked fall of temperature occurred, the thermometer falling about 20° to 25° lower in some parts of the south and east of England and the midland counties than on the day previous. On the 25th, 26th and 27th a remarkably severe frost occurred which did an immense amount of injury to fruit and vegetation. In most parts of the country except the Channel Islands the shade thermometer fell well below freezing point. At Balmoral, 930 feet above sea level, as low

a value as 21° was recorded on the 25th, and as far south as Marlborough a reading of 27° was noted as late as the 27th. In Ireland the sharpest frost occurred on the 25th, when Markree Castle reported a temperature of 26°. By the end of the month warmer weather was being experienced very generally.

The general rainfall for the month expressed as a percentage of the average was—England and Wales, 80; Scotland, 108; Ireland, 77; British Isles, 87.

REVIEWS.

The Rainfall of California. By ALEXANDER G. MCADIE. University of California Publications in Geography, Vol. 1., No. 4. Berkeley, 1914. Size 11 × 7. Pp. 114, 7 plates. Price 1 dollar.

THE geograpical situation of California on the western seaboard of the United States makes the study of the distribution of its rainfall a peculiarly interesting problem, but the numerous controlling factors and the great diversity of the land surface render the task one of exceptional difficulty.

Professor McAdie discusses in some detail the factors which determine the rainfall in different parts of the State, the chief of which are the movements of the permanent high and low pressure areas, the prevailing W.–E. wind drift, the proximity of the Pacific Ocean, and the land relief. The climatic features are also broadly described so far as they bear on the distribution of rainfall.

In its general nature the seasonal distribution of rainfall may be described as consisting of a single wet season in winter and an almost rainless summer. This dry season occurs over the whole State, but varies somewhat in length in different parts.

The annual rainfall is greatest in the north, exceeding 40 inches on the coast and over the Sierra Nevada. It falls off towards the south, rapidly in the valley and less so over the mountains, and the south-eastern districts receive a rainfall of less than 10 inches. Rather more than this amount falls along the coast. There is a general correspondence between the amount of rainfall and the elevation of the land, but no great success has attended attempts to express this relationship numerically. Above 7,000 or 8,000 feet no further increase seems to take place, and it is interesting to note that the rainfall maximum in the mountain region is found to lie to the west of the mountain crest. This is the reverse of the condition observed in the British Isles, where the rainfall maximum usually occurs to the leeward of the highest land. The greater elevation of the Californian mountains probably causes this reversal, but it is necessary to bear in mind that it is notoriously difficult to estimate the amount of precipitation at great elevations, and that this difficulty is enormously increased when, as is the case in the Sierra Nevada, the whole of the fall takes the form of snow. Professor Church's

experiments on snow content show that the equivalent of a foot of snow may be a very variable quantity, and Professor McAdie has himself found that 1 inch of water may be the product of as much as 20 inches of loose snow or as little as 4 inches of compact snow.

The volume contains the average seasonal (July—June) rainfall values for nearly 400 stations. The period covered by the records is however in many cases extremely short, and it is not made clear that any attempt has been made to correct short-period averages to their equivalent over a long period. Judging by the great fluctuations from year to year in the seasonal fall at San Francisco and Sacramento, the records for which are given in detail, it must be inferred that considerable uncertainty exists in some cases as to the comparability of the average values. C.S.

Meteorological Office—The Seaman's Handbook of Meteorology. A Companion to the Barometer Manual for the use of Seamen. London, H.M. Stationery Office, 1914. Size $9\frac{1}{2} \times 6$. Pp. $6 + 191 + 25$ plates. Price 2s.

THIS work fills a distinct gap in the existing literature for seamen and is aptly described as a "Companion" to the well-known Barometer Manual issued by the Meteorological Office for the use of mariners. The author of the work is Commander Campbell Hepworth, Superintendent of the Marine branch of the Meteorological Office whose long experience both as a practical seaman and oceanographer, is an ample guarantee that the wide subject dealt with has been treated in a thoroughly "shipshape" and "Bristol" fashion.

Dr. W. N. Shaw contributes a preface in which the primary objects in view in the preparation of this work are set forth, these were :— "First that trustworthy information about the weather in every part of the navigable seas should be supplied to the seafaring community, and thereby the seaman should be enabled to know what to expect in the way of weather, *as a rule*, on any voyage that he might have to make. Secondly, by the use of the knowledge so collected, to enable him to make the most of conditions of weather generally favourable, by the choice of his route, or the time of his voyages, or the setting of his course ; and thirdly, by the study of the laws of weather to enable him to know what sort of weather to expect from day to day, and to make the best of bad weather, if he had to face it." In the 17 pages which form Dr. Shaw's introduction is given a very clear and eminently readable summary of marine meteorology of to-day in its practical aspects. This is a portion of the book which could be read with profit even by the land meteorologist, treating as it does with the direct application of many important investigations carried out in the Meteorological Office to the needs of seamen. In the concluding paragraphs reference is made to some aspects of world-meteorology in which the issue of seasonal forecasts for the whole earth is suggested,

the key to this problem being guardedly stated as to be found "not so much in the heat of the tropics as in the cold of the poles."

The work proper consists of eleven chapters and two appendices. In the opening sections such subjects as the atmospheric circulation, temperature, humidity, pressure and winds are treated by Captain Hepworth. Chapter IV. deals with clouds, this portion being illustrated by a beautiful coloured series of reproductions of cloud forms from the International Cloud Atlas. Subsequent chapters deal more particularly with weather phenomena in which mist, fog and precipitation are first discussed followed by a description of atmospheric pressure in relation to weather conditions, the various types of these conditions, and rules and suggestions for anticipating the weather by observations at a single station. An eminently useful chapter is number IX. which discusses the gales of our coasts, their seasonal and relative frequency from various compass points, as influenced by locality. The tracks and speed of storm centres are also referred to, this section being largely based on researches carried out by Mr. Brodie of the Forecast Division of the Meteorological Office.

Chapter X., which treats of Icebergs and other forms of drifting ice, is one of much interest incorporating as it does the most recent information regarding the polar ice of both hemispheres, the data being given not only in the form of tables but graphically. We may specially draw attention to the reproductions of the ice charts for May and August, 1911, issued by the Danish Meteorological Institute, which afford a striking example of the amount of melting that goes on in summer to the north and north-east of our Islands, in the North Atlantic, and in the Greenland and Barents Seas. The currents and ice drift in the southern hemisphere are indicated on a map of the antarctic regions (plate xxv.). This map is not quite up to date since it does not include the land discoveries or oceanic results of Dr. Filchner's expedition of 1911-12, which filled in an important gap in the Weddell Sea area. The recent results of Dr. Mawson's expedition are also absent, but these could hardly have been incorporated at the time when the map was prepared. The concluding chapter deals with meteorological instruments used on land and sea, and there are two appendices treating of the displacement of the horizon and of various aspects referring to weather reports and storm warnings, including a list of storm signal stations.

A special feature of the work is the excellent and well chosen character of the illustrations which graphically elucidate the many important points referred to in the text. One feature may be specially emphasised, namely, the large amount of research bearing on problems of practical interest to seamen which the Meteorological Office has been able to carry out in recent years and which is incorporated from time to time in the volume under notice.

This Handbook forms a valuable addition to the scientific literature of the Chart Room and is one that should also circulate extensively among students of meteorology.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

VISIBILITY.

In my opinion the haziness of the air is dependent on the character of the district from which it comes, and not on the direction of the wind. On the east and north-east coasts it is the E. and N.E. winds that are clear, the land winds, at least on the coast from Scarborough to Alnwick, are thick.

On the west coast of Scotland, which I know well, the smoke from the colliery districts of the Clyde is plainly apparent up the coast to Oban or even Fort William. From Tarbert on Lock Fyne to Crinan at the north end of the canal the E. to S.E. winds are thick, all others clear.

In South Oxfordshire (Watlington), where I have lived for eight years, with a magnificent view of 30 to 40 miles extent the same rule holds. Here winds between E. and S.E. are thick, because they come from London, a distance of over 40 miles. Winds from S.E. through S. round to W.N.W. are clear. N.W. winds are distinctly thick and a map shows the reason at once, since Birmingham and Wolverhampton lie to the N.W. Again from N. to E. the winds are clear.

In South Oxfordshire unusual visibility is certainly not a sign of rain or wind, neither do I believe it to be so on the west coast of Scotland. It is, perhaps, more prevalent in rainy weather, but after just as much as before rain, also I have often noticed it in continuous fine settled weather.

I think smoke from a place like the London or Clyde districts can be traced with precision for at least a hundred miles, and I have noticed that the layer is very thin, 2,000 ft. perhaps at the outside. Thus a balloon viewed through a theodolite often becomes more distinct with increasing angular altitude even though its distance is increasing, it is the air near the surface that obscures it, not the air of the upper layers.

W. H. DINES.

June 3rd, 1914.

THE MAY FROSTS.

You will probably be receiving accounts from different districts of the remarkable damage to vegetation done by the frosts of last month. Here the outstanding feature was the damage done to the foliage of forest trees. On the morning of May 2nd temperature in the screen fell to 23°·9, which is the lowest we have had in May since 1879, when there was a reading 0°·1 lower; on the grass the min. was 18°·5, but this is not so unusual. The result was ruin to

the prospects of the fruit crop, which up to then had been excellent. Potatoes also and other garden stuff were badly cut. The oak trees were just getting into full leaf of a bright yellowish green; on the low ground they were entirely blackened, though on higher situations they escaped, while in some cases the lower branches were cut, leaving the tops green. This remarkable effect is general over North Notts, though it does not seem to extend much further south. I am told the oaks have suffered in a similar way throughout Yorkshire and at least as far north as Durham. After four weeks a few of the trees are putting out some fresh leaves, but the general appearance of oak woods is still a dark brown. I have met with no one who remembers having seen oaks injured in this way before. Walnuts were also badly cut and are still quite black; Spanish chestnuts were much injured, and other trees, such as beech and sycamore to a less extent. Ash, which often suffer in the spring, were fortunately not out, except young plants, and these were cut. More injury was done by a frost on the 26th, which seems to have had serious consequence further south.

A gardener of experience compares the damage done on May 2nd with June 1st, 1864. Have any of your readers any records for that date?

H. MELLISH.

Hodsock Priory, Worksop, 1st June, 1914.

THE ENGLISH CLIMATE: A REJOINDER.

SINCE Mr. Alldridge, in his reference last month to my recent letter on the climate of Torquay, goes out of his way to charge me with seeming to him to "nurse a personal grudge against the British climate," I may, perhaps, be permitted to inform him that I am so deeply rooted to my native English soil that, on this consideration alone, I should never live abroad. I consider the English climate to be meteorologically most interesting and inspiring in its stormy changeable northern character, and this is why I am sometimes fond of emphasizing certain climatic features which are ridiculously supposed by some people to be "bad." The English climate, moreover, is, on the whole, extremely salubrious and admirably conducive to the moral, intellectual, and physical development of a great nation, although, as Mr. Alldridge recognises, the mean winter temperature of Penzance is some 6° higher than that of Peterborough. This, however, is nothing more than a minor climatic difference—not big enough to subvert the broad general effects of the different types of weather which affect the whole country. I grant, nevertheless, that minor differences may be important to invalids.

L. C. W. BONACINA.

Hampstead, N.W., May 19th, 1914.

A WEATHER COINCIDENCE.

THE extraordinary similarity in the weather of April and May this year seems worthy of record.

In both the first eleven days were wet, cold and rough, the lowest barometric reading being on the 7th in each month. The April rainfall in those days was 1·40 in., and in May, 1·34 in.

In both months brilliant hot sunny days with cool nights followed till the 22nd, on which day electrical disturbances brought rain in both months, and were followed by a cold snap of four days.

On April 26th there was a sharp ground frost, min. screen temp. 34°.

On May 26th the frost was even more severe, 32° being recorded (31° on the morning of the 27th).

On only one day in April (the 7th) the max. temp. did not exceed 50°.

On only one day in May (the 9th) the max. temp. did not exceed 50°.

There were three nights in April and also in May with a screen temperature of 32° or below.

It would, I think, be hard to find two so similar periods.

CHARLES P. HOOKER.

Cirencester.

THE THUNDERSTORMS OF MAY 7th & 22nd.

THE first thunderstorm of the season in London, on May 7th, was of a violence such as experience shows we ought to expect during the month of May. After a heavy, chilly shower, about 1.0 p.m., the atmosphere suddenly became oppressive, whilst a superb mountain mist of cumulus cloud, with snow-white summits and dark tawny bases, developed in the eastern sky simultaneously with the approach of a dense black storm sheet from the west. After ominous rumblings of thunder and heavy rain for two hours, there occurred, about 4.15 p.m., in South Kensington and other parts of London, a tremendous flash of forked lightning between the clouds and the earth, followed by an instantaneous crash like an explosion of dynamite—the very hall-mark of a severe thunderstorm.

The storm of the 22nd was a hot weather production. It was of a somewhat rainless, and, therefore, dangerous character in many places, but the most remarkable feature was the lack of any interval between the brilliant discharges. A bitter boreal wind followed in its wake straight from the northern ice-fields and blew for some days.

When I saw the Daily Weather Report for the morning of May 22nd and saw that the south of England lay in the neck between two anticyclonic systems—the most thundery of all types of pressure distribution—I was astonished that the forecast contained no anticipation of thunder, especially in view of the prevailing hot sunny weather.

L. C. W. BONACINA.

Hampstead, N.W., May 28th, 1914.

RAINFALL TABLE FOR MAY, 1914.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	RAINFALL OF MONTH.	
					Aver. 1875—1909.	1914.
		° ′	° ′	ft.	in.	in.
Camden Square	*London*	51 32	0 8	111	1·75	1·74
Tenterden	*Kent*	51 4	*0 41	190	1·65	1·12
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·80	1·01
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	1·96	1·32
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·81	1·35
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	1·99	1·23
Shoeburyness	*Essex*	51 31	*0 48	13	1·27	·87
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·93	1·33
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·78	1·27
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·08	1·34
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·02	1·87
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·10	1·67
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·64	1·22
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·15	1·08
Boston	*Lincolnshire*	52 58	0 1	11	1·80	·82
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	2·08	1·56
Macclesfield	*Cheshire*	53 15	2 7	501	2·43	2·82
Southport (Hesketh Park)	*Lancashire*	53 39	2 59	38	2·13	1·95
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	3·55	2·93
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	2·09	1·33
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·98	1·83
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·04	1·23
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	7·50	7·70
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·56	2·32
Haverfordwest	*Pembroke*	51 48	4 58	90	2·62	2·22
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	2·63	3·03
Llandudno	*Carnarvon*	53 20	3 50	72	1·86	1·76
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	2·87	2·33
Marchmont House	*Berwick*	55 44	2 24	498	2·53	2·06
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	2·98	3·37
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·40	1·85
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	3·53	3·25
Mull (Quinish)	,,	56 34	6 13	35	2·99	2·38
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·05	1·84
Braemar	*Aberdeen*	57 0	3 24	1114	2·33	2·19
Aberdeen (Cranford)	,,	57 8	2 7	120	2·40	2·61
Cawdor	*Nairn*	57 31	3 57	250	2·07	4·06
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	2·36	4·21
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	4·54	5·57
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·19	2·18
Wick	*Caithness*	58 26	3 6	77	2·04	2·40
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·05	1·59
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·33	1·34
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·51	1·29
Ennistymon House	*Clare*	52 57	9 18	37	2·70	2·29
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·24	1·97
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·43	1·80
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·07	1·83
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·51	2·78
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	3·17	2·64
Cong (The Glebe)	,,	53 33	9 16	112	2·94	2·41
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	2·80	2·57
Seaforde	*Down*	54 19	5 50	180	2·72	1·77
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·37	1·84
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·66	1·85

RAINFALL TABLE FOR MAY, 1914—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875—1909. in.	1914. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION.
— ·01	99	·90	7	8	8·68	9·98	+1·30	115	25·11	Camden Square
— ·53	68	·29	23, 31	13	9·41	11·96	+2·55	127	27·64	Tenterden
— ·79	56	·32	3	9	10·33	13·14	+2·81	127	30·48	Patching
— ·64	67	·36	3	14	11·14	12·99	+1·85	117	31·87	Cadland
— ·46	75	·30	7	15	8·33	8·07	— ·26	97	24·58	Oxford
— ·76	62	·36	22	12	9·04	6·55	—2·49	73	25·17	Croyland Abbey
— ·40	69	·27	7	9	6·23	7·52	+1·29	121	19·28	Shoeburyness
— ·60	69	·35	7	12	8·55	10·13	+1·58	118	25·40	Westley
— ·51	71	·30	8	16	7·84	8·56	+ ·72	109	23·73	Geldeston
— ·74	64	·32	3	15	13·70	18·23	+4·53	133	38·27	Polapit Tamar
— ·15	93	·56	3	16	12·15	13·10	+ ·95	108	33·54	Rousdon
— ·43	80	·40	3	13	10·65	10·62	— ·03	100	29·81	Stroud
—1·42	46	·26	11	14	11·71	10·20	—1·51	87	32·41	Wolstaston
—1·07	50	·22	22	11	10·23	7·36	—2·87	72	28·98	Coventry
— ·98	46	·22	22	13	7·91	6·80	—1·11	86	23·35	Boston
— ·52	75	·45	24	11	8·74	5·99	—2·75	69	24·46	Hodsock Priory
+ ·39	116	·43	5	15	11·91	13·66	+1·75	115	34·73	Macclesfield
— ·18	92	·38	3	18	10·70	9·65	—1·05	90	32·70	Southport
— ·62	82	1·04	3	15	23·59	25·28	+1·69	107	61·49	Arncliffe
— ·76	64	·38	23	8	9·46	7·42	—2·04	79	26·87	Ribston Hall
— ·15	92	·60	22	14	8·99	6·95	—2·04	77	26·42	Hull
— ·81	60	·32	8	14	9·51	7·38	—2·13	78	27·94	Newcastle
+ ·20	103	1·55	3	20	49·44	60·79	+11·35	123	129·48	Seathwaite
— ·24	91	·68	3	19	14·67	18·19	+3·52	124	42·28	Cardiff
— ·40	85	·59	3	11	16·71	16·38	— ·33	98	46·81	Haverfordwest
+ ·40	115	·78	5	13	15·15	18·57	+3·40	122	45·46	Gogerddan
— ·10	95	·35	8	13	10·40	10·06	— ·34	97	30·36	Llandudno
— ·54	81	·54	4	16	16·22	21·38	+5·16	132	43·47	Cargen
— ·47	81	·85	8	10	12·00	10·34	—1·66	86	33·76	Marchmont
+ ·39	113	·68	9	18	18·06	24·03	+5·97	133	49·77	Girvan
— ·55	77	·40	4	17	13·10	15·27	+2·17	117	35·97	Glasgow
— ·28	92	·80	4	20	25·68	33·31	+7·63	130	68·67	Inveraray
— ·61	80	·49	4	19	20·25	23·08	+2·83	114	56·57	Quinish
— ·21	90	·32	8	13	9·96	9·81	— ·15	98	28·64	Dundee
— ·14	94	1·06	8	14	12·97	15·10	+2·13	116	34·93	Braemar
+ ·21	109	1·14	8	16	12·00	10·47	—1·53	87	32·73	Aberdeen
+1·99	196	1·90	7	8	10·38	10·61	+ ·23	102	29·33	Cawdor
+1·85	179	1·51	8	18	18·15	17·97	— ·18	99	44·53	Fort Augustus
+1·03	123	1·55	8	18	33·48	42·57	+9·09	127	83·93	Bendamph
— ·01	100	·36	8	12	12·18	12·88	+ ·70	106	31·90	Dunrobin Castle
+ ·36	118	·94	8	20	10·88	11·04	+ ·16	101	29·88	Wick
—1·46	52	·30	5, 8	13	21·95	28·96	+7·01	132	54·81	Killarney
— ·99	58	·27	3, 9	12	14·61	14·16	— ·45	97	39·57	Waterford
—1·22	51	·23	9	12	14·81	17·68	+2·87	119	39·43	Castle Lough
— ·41	85	·61	9	20	16·49	22·03	+5·54	134	46·52	Ennistymon
— ·27	88	·43	9	11	12·83	13·13	+ ·30	102	34·99	Courtown Ho.
— ·63	74	·40	4	15	13·26	14·28	+1·02	108	35·92	Abbey Leix
— ·24	88	·44	5	17	10·15	8·13	—2·02	80	27·68	Dublin
+ ·27	111	·40	9	18	13·29	14·66	+1·37	110	36·15	Mullingar.
— ·53	83	·48	7	22	20·21	24·58	+4·37	122	52·87	Enniscoe
— ·53	82	·56	9	14	18·23	23·48	+5·25	129	48·90	Cong
— ·23	92	·43	7	18	15·72	19·25	+3·53	122	42·71	Markree
— ·95	65	·29	4	15	14·54	13·75	— ·79	95	38·91	Seaforde
— ·53	78	·44	7	16	12·93	14·64	+1·71	113	37·56	Dundarave
— ·81	70	·37	4	15	14·28	17·58	+3·30	123	39·38	Omagh

SUPPLEMENTARY RAINFALL, MAY, 1914.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	1·61	XI.	Lligwy	1·52
,,	Ramsgate	1·19	,,	Douglas	2·94
,,	Hailsham	·87	XII.	Stoneykirk, Ardwell House...	2·75
,,	Totland Bay, Aston House...	·62	,,	Dalry, The Old Garroch.....	2·93
,,	Stockbridge, Ashley..	1·25	,,	Beattock, Kinnelhead	3·36
,,	Grayshott	1·30	,,	Langholm, Drove Road	2·39
III.	Harrow Weald, Hill House...	1·86	XIII.	Meggat Water, Cramilt Lodge	2·62
,,	Caversham, Rectory Road ...	1·79	,,	North Berwick Reservoir... ..	1·51
,,	Pitsford, Sedgebrook...	1·03	,,	Edinburgh, Royal Observaty.	1·93
,,	Woburn, Milton Bryant.....	1·07	XIV.	Maybole, Knockdon Farm ...	2·22
,,	Chatteris, The Priory..... ...	·82	XV.	Ballachulish House	...
IV.	Elsenham, Gaunts End	1·12	,,	Campbeltown, Witchburn ..	2·65
,,	Colchester, Hill Ho., Lexden	1·38	,,	Holy Loch, Ardnadam.....	3·64
,,	Ipswich, Rookwood, Copdock	1·04	,,	Islay, Eallabus	2·41
,,	Blakeney..... . ..	·81	,,	Tiree, Cornaigmore	1·35
,,	Swaffham	1·12	XVI.	Dollar Academy	2·98
V.	Bishops Cannings	1·77	,,	Balquhidder, Stronvar.....	...
,,	Wimborne, St. John's Hill...	1·30	,,	Glenlyon, Meggernie Castle..	2·54
,,	Ashburton, Druid House.. ...	2·23	,,	Blair Atholl	1·58
,,	Cullompton	2·01	,,	Coupar Angus	1·84
,,	Lynmouth, Rock House	2·09	,,	Montrose, Sunnyside Asylum.	1·98
,,	Okehampton, Oaklands.. ...	2·02	XVII.	Alford, Lynturk Manse	2·78
,,	Hartland Abbey.....	1·45	,,	Fyvie Castle	4·11
,,	Probus, Lamellyn.....	1·21	,,	Keith Station	4·83
,,	North Cadbury Rectory.....	2·11	XVIII.	Rothiemurchus	3·34
VI.	Clifton, Pembroke Road.....	2·02	,,	Loch Quoich, Loan	10·95
,,	Ross, The Graig	1·64	,,	Drumnadrochit	5·66
,,	Shifnal, Hatton Grange.....	1·28	,,	Skye, Dunvegan	3·41
,,	Droitwich.....	1·67	,,	Lochmaddy Bayhead	1·39
,,	Blockley, Upton Wold.....	1·73	,,	Glencarron Lodge	5·46
VII.	Market Overton.....	1·70	XIX.	Invershin	1·92
,,	Market Rasen	2·16	,,	Melvich	3·31
,,	Bawtry, Hesley Hall	1·39	,,	Loch Stack, Ardchullin	6·57
,,	Derby, Midland Railway.....	1·79	XX.	Skibbereen Rectory	1·41
,,	Buxton	3·09	,,	Dunmanway, The Rectory ..	2·04
VIII.	Nantwich, Dorfold Hall	1·90	,,	Glanmire, Lota Lodge, No. 1	1·51
,,	Chatburn, Middlewood	2·19	,,	Mitchelstown Castle	1·56
,,	Cartmel, Flookburgh	2·62	,,	Darrynane Abbey.....	2·20
IX.	Langsett Moor, Up. Midhope	1·86	,,	Clonmel, Bruce Villa	1·43
,,	Scarborough, Scalby	2·03	,,	Newmarket-on-Fergus, Fenloe	1·64
,,	Ingleby Greenhow	2·34	XXI.	Laragh, Glendalough	2·73
,,	Mickleton	2·20	,,	Ballycumber, Moorock Lodge	1·76
X.	Bellingham, High Green Manor	2·18	,,	Balbriggan, Ardgillan	1·90
,,	Ilderton, Lilburn Cottage ...	1·54	XXII.	Woodlawn	1·93
,,	Keswick, The Bank.....	2·40	,,	Westport, St. Helens	2·65
XI.	Llanfrechfa Grange	2·19	,,	Dugort, Slievemore Hotel ...	3·29
,,	Treherbert, Tyn-y-waun	5·27	,,	Mohill Rectory	2·02
,,	Carmarthen, The Friary	3·03	XXIII.	Enniskillen, Portora.....	1·61
,,	Castle Malgwyn [Llechryd]...	2·07	,,	Dartrey [Cootehill]	1·39
,,	Crickhowell, Tal-y-maes.....	2·80	,,	Warrenpoint, Manor House ..	1·68
,,	New Radnor, Ednol	2·06	,,	Banbridge, Milltown	...
,,	Birmingham WW., Tyrmynydd	3·46	,,	Belfast, Cave Hill Road	2·05
,,	Lake Vyrnwy	3·19	,,	Glenarm Castle..... ...	1·81
,,	Llangyhanfal, Plâs Draw.....	1·89	,,	Londonderry, Creggan Res...	2·41
,,	Dolgelly, Bryntirion.....	5·10	,,	Dunfanaghy, Horn Head ...	2·45
,,	Bettws-y-Coed, Tyn-y-bryn...	3·04		Killybegs	3·70

METEOROLOGICAL NOTES ON MAY, 1914.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Unsettled weather characterised the first fortnight, a few brilliant days contrasting markedly with the generally dull, cheerless weather. A week of beautiful sunny and warm weather followed, several days being practically cloudless. The last week was again unsettled with low temp. Mean temp. 55°·2 or 1°·2 above the average. Duration of sunshine 187·1* hours, and of R 19·6 hours. Evaporation 2·56 in. Shade max. 82°·9 on 22nd; min. 37°·7 on 26th. F 0, f 0.

TENTERDEN.—The effect of the dry weather is seriously felt. Hot from 19th to 23rd, then cold with ground frosts at night. Duration of sunshine 229† hours. Shade max. 77°·5 on 22nd; min. 35°·5 on 26th and 27th. F 0, f 6.

TOTLAND BAY.—The driest May for 10 years. Duration of sunshine 216·2* hours. Shade max. 71°·1 on 18th; min. 37°·8 on 26th. F 0, f 2.

PITSFORD.—Mean temp. 51°·7. R 1·01 in. below the average. Shade max. 75°2 on 22nd; min. 28°6 on 2nd. F 4.

IPSWICH, COPDOCK.—The first 14 days were dull, cold and damp, after which a brilliant spell of sunshine set in lasting on and off till the close, though only the 18th to 23rd were warm. Mean temp. 51°·8. Duration of sunshine 219·8* hours. Shade max. 77°·3 on 21st; min. 33°·0 on 29th. F 0, f 10.

POLAPIT TAMAR.—An unseasonable month. Dry with high day and low night temp. Shade max. 73°·0 on 19th; min. 32°·3 on 26th. F 0, f 4.

NORTH CADBURY.—A month of violent changes and extremes. Frosts on 26th and 27th did considerable harm. Shade max, 80°·5 on 22nd; min. 33°·0 on 27th. F 0, f 6.

HODSOCK PRIORY.—Unusual damage done by frosts on 2nd and 26th. Shade max. 74°·1 on 18th; min. 23°·9 on 2nd. F 4, f 10.

SOUTHPORT.—An unusual deficiency of E. winds, a feature that has characterised the whole spring. Duration of sunshine 165·5* hours, and of R 52·1 hours. Mean temp. 50°·7 or exactly normal. Evaporation 2·46 in. Shade max. 68°·0 on 16th; min. 33°·0 on 2nd. F 0, f 6.

HULL.—Showery from 3rd to 13th, then fine and dry to 21st. Warm and sultry on 22nd with severe TS at night. Duration of sunshine 101·2* hours. Shade max. 73°·0 on 18th; min. 34°·0 on 10th and 26th. F 0, f 5.

HAVERFORDWEST.—Duration of sunshine 210·4* hours. Great damage done by frost. Shade max. 66°·6 on 15th; min. 33°·0 on 26th.

LLANDUDNO.—Shade max. 69°·0 on 16th; min. 35°0 on 2nd.

CARGEN.—A sunless though dry month. Last 9 days unusually cold. Shade max. 72°·0 on 15th: min. 34°·0 on 26th and 27th.

EDINBURGH.—Shade max. 69°·6 on 17th; min. 33°·6 on 10th. F 0, f 7.

COUPAR ANGUS.—Severe frost on 25th did much damage to early fruits and exposed potato fields. Shade max. 72°·0 on 17th; min. 28°·0 on 25th.

DRUMNADROCHIT.—Persistent cold winds mainly from N. On 7th and 8th R fell continuously for 28 hours, the aggregate fall being 4·65 in. of which 3·38 in. fell on 8th, a record daily fall. Frost on 25th caused general destruction of young growths of vegetation and garden produce.

LOCH STACK.—Duration of sunshine 122·7* hours.

DUNMANWAY.—A fine month and warm from 12th to 21st. Severe frost on night of 24th injured potatoes in low lying fields.

DUBLIN.—A generally favourable month of average temp., but with alternate periods of severe cold and moderate warmth for the time of year. Mean temp. 52°·4 Shade max. 68°·8 on 17th; min. 35°·5 on 25th. F 0, f 0.

OMAGH.—The weather up to the 12th was cold and wet, remainder of month was fine, but temp. below average. Frost on 24th considerably damaged potato crop.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, December, 1913.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	55·3	9	26·9	25	46·2	37·3	37·5	86	70·7	22·7	·79	8	7·1
Malta	65·3	4, 26	43·5	10	63·6	51·4	47·7	75	132·0	..	2·71	10	1·4
Lagos	99·5	17	68·0	26	90·4	73·6	72·2	73	143·2	64·4	·11	2	4·6
Cape Town	87·1	21	49·5	12	73·9	56·7	53·8	67	...	...	1·53	8	4·4
Natal, Durban ...	80·0	15	60·0	27	74·5	67·1	66·7	79	...	...	6·11	13	6·0
Johannesburg	90·0	23	49·6	5	80·3	56·7	54·4	66	162·9	47·5	3·31	14	4·4
Mauritius	92·1	6	68·0	28	85·2	71·3	68·0	73	159·5	60·5	5·37	18	6·4
Bloemfontein	96·4	22*	47·3	4	88·5	59·4	53·8	68	...	...	·00	0	2·7
Calcutta...	81·1	10	48·3	28, 29	76·0	56·8	55·4	69	...	38·5	·14	1	2·1
Bombay...	87·7	16	63·7	26	83·5	69·8	65·8	70	135·5	53·2	·00	0	1·3
Madras	85·6	9	66·1	25	83·1	71·1	69·9	83	133·3	63·3	9·51	12	5·2
Colombo, Ceylon ...	89·2	25†	65·4	28	85·3	72·3	71·9	81	162·2	54·8	11·77	18	5·6
Hongkong	72·5	15	44·4	31	64·9	56·5	51·0	68	...	...	1·39	9	6·7
Sydney	95·2	25	57·3	17, 21	77·3	62·9	54·9	55	153·8	46·5	·23	6	5·6
Melbourne	99·9	29	47·3	1	79·7	56·4	50·0	50	164·8	40·6	1·48	5	3·8
Adelaide	110·7	1	51·7	26	86·1	61·7	50·5	40	168·4	43·1	2·47	2	3·2
Perth	96·1	27	50·3	5	76·2	59·4	56·3	67	159·0	44·0	1·68	14	4·5
Coolgardie	106·2	10	50·4	22	88·8	61·6	51·8	42	170·6	47·8	2·30	5	2·3
Hobart, Tasmania ..	101·3	30	44·0	7	69·2	51·8	46·4	57	154·1	39·9	1·75	12	6·7
Wellington	78·8	31	44·0	6	65·4	52·7	51·2	75	145·2	32·0	7·51	19	7·4
Auckland	...	...	...	...	66·3	54·2	..	...	...	...	2·80	16	...
Jamaica, Kingston ..	89·3	5	67·6	2	87·0	69·2	67·0	78	...	...	·17	5	3·6
Grenada	87·0	25	70·0	20	82·9	73·1	...	77	136·0	...	5·50	16	4·0
Toronto	53·7	5	6·4	27	39·3	27·4	27·2	83	99·4	4·3	1·04	6	...
Fredericton	47·0	8	-12·5	29	31·5	15·6	...	79	...	...	2·69	10	6·0
St. John, N.B. ...	50·2	8	8·5	28	35·7	22·2	23·0	76	...	...	3·72	15	6·0
Edmonton, Alberta ...	59·3	10	-10·0	25	31·6	12·8	...	82	98·9	-11·8	·10	5	4·3
Victoria, B.C.	50·0	14	33·7	21	46·0	33·7	40·0	87	...	...	1·35	14	7·0

* and 23. † and 28.

MALTA.—Low rainfall.

Johannesburg.—Bright sunshine 283·3 hours.

Mauritius.—Mean temp. of air normal, dew point 0°·5 above, and R ·51 in. above, averages. Mean hourly velocity of wind 11·2 miles, or 0·4 above average.

Bloemfontein.—The first December without rain on record.

COLOMBO.—Mean temp. of air 78°·8, or 0°·3 below, of dew point 0°·4 above, and R 6·42 in. above, averages. Mean velocity of wind 4·2 miles per hour. TS8 on 9 days.

HONGKONG.—Mean temp. of air 61°·0. Mean hourly velocity of wind 9·9 miles. Bright sunshine 124·8 hours.

Melbourne.—Mean temp. of air 3°·4 above, and R ·82 in. below, averages.

Adelaide.—Mean temp. of air 2°·8 above, and R 1·53 in. above, averages; 2·42 in. of rain fell on one day, a record for December.

Perth.—Rainfall below the average.

Coolgardie.—Temp. of air 0°·1 below, and R above, averages.

Hobart.—Temp. of air 0·2° above, and R ·18 in. below, averages.

Wellington.—Rainfall over double the average. Total sunshine 218·2 hours.

JAMAICA.—Rain much below average.